THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., JANUARY 22, 1891.

THE WEEK IN IRON CIRCLES.

General Features.

That the financial skies are clearing is daily more and more apparent. The return of confidence, as predicted, is very gradual, but each day brings added assurance that the worst is over, and the easing up of the financial strain is now naturally following. As a logical sequence, the iron market is slowly awakening to life, though the process seems even more gradual than the revival of the money market. The Chicago pig iron market continues fairly active, various good-sized contracts having been placed by the larger consumers. Buyers are realizing that their stocks have been heavily reduced, and that the present is a favorable time in which to make running contracts for forward delivery. The activity continues to be mainly in the lines of local coke and Southern brands, prices ruling low on metal of all classes; notwithstanding this, many consumers are looking for lower range of market yet. Lake Superior charcoals are for the most part inactive, the leading furnaces in that region being unwilling to meet figures which have been made by two or three companies having large stocks, and pressed for money. Ohio softeners continue in small demand. As money gets easier, better feeling prevails among melters of iron. Conservatism, however, still prevails in most quarters, and there are few consumers who feel warranted in contracting ahead merely as speculation, though prices on pig metal range lower than have been known for years, at this season. Concerning the Detroit market, our well-informed correspondent writes: "The money market having become easier, together with the blowing out of so many large furnaces in the Mahoning and Shenango valleys, would naturally seem good reasons for firmer and even higher prices, but the market here does not show any improvement. The buyers are few who are willing to place orders except to cover contracts. They admit that prices are not likely to go much, if any, lower, but there does not seem to be much apprehension that any sudden advance will take place, and when the change does come they think they will have time to place their orders at old prices. Stocks in consumers' hands are light, and orders for small lots for prompt shipment are being received. No particular class of iron is being called for, and all grades are about equal in demand, but silvery and mottled are, perhaps, the scarcest, with prices only moderately firm. Some Southern irons are being offered by speculators at 25 cents under furnace quotations, but few sales have been made for any but small lots." There has been a fairly firm tone to the pig iron market, at Cincinnati, during the week, with improved inquiry, and a larger range of business than has been reported for many weeks previous. Values rule very low, and will continue to do so until accumulated stocks here and there are closed out. There are signs that this liquidating process is already pretty well completed. The strike in the Birmingham district is practically over, but there will be no large increase in the rate of production until values improve. Probably four or five furnaces in all that are now banked will start up. The stoppage of the Mahoning and Shenango furnaces has not perceptibly affected the market in the North, yet there are considerable accumulations in that district. It is estimated that the rate of production, taken together, has been reduced since December 31 to about 1,500,000 tons per annum. Increased inquiry for pig is noted at Louisville, and while the extent of sales is small, the prospect of good buying is better than for some weeks past. Consumers recognize that prices are below cost of production, and that any change in prices to a lower basis would be so insignificant that it could not affect them in competition in making prices on their product; while, on the other hand, the conditions point to at least a firm, if not an advancing market. At St. Louis a few small orders are being placed at very low figures. There is evidently a scarcity of Southern iron, for prompt shipment, and we look for improvement in prices soon. Concerning the general outlook the *Bulletin* of the American Iron and Steel Association, after referring to the well-known unfavorable conditions, says: "These are the unfavorable conditions; what are the favorable conditions? First, the situation in the steel rail trade promises improvement through the better tone in the stock market, the better understanding among Western railroad managers concerning freight rates, and the consolidation last week of the two steel rail companies at Scranton, which we are advised has actually taken place. Next, it may be said with confidence that all, or nearly all, the demands of the furnacemen in the Shenango and Mahoning valleys will be granted, which concessions will enable them to meet Southern competition on more favorable terms than they have recently been able to do. In the South the prevailing strike is really a godsend in disguise to furnace owners, as the enforced decrease in production, like the shut-down in the Shenango and Mahoning valleys, must of itself prevent a further increase in stocks and decrease already accumulated stocks. Following a reduction in stocks will come firmer pig iron prices, which are among the possibilities of the near future. But most likely the first turn for the better in the iron trade of this country will be in steel rail prices."

The Local Situation.

"What will be the effect of the present depression upon the ore business?" and "How much ore will come down this year?" are the questions that demand the attention of all the kindred interests at this time. The first question can be answered with some sort of definitiveness, for every month's idleness at the point of consumption—the furnaces—means a corresponding reduction of activity in the ore regions. In other words, if the furnaces should not go into blast again until, say, the latter part of March, the direct cutting-off in the ore supply would mean a million tons. This, of course, is only a fraction of the reduction expected in the season's output of ore. The very large quantity left over from last year must be kept in mind, so that the best judges of the situation place the 1891 figure at or below six million tons. There are some, indeed, who think the shrinkage will be much greater, and they may prove to be right, in the end. There is, however, no doubt that a great deal less ore will be mined in '91 than was the case last year, and it is quite as certain that it will sell at a much closer profit margin. Everybody is agreed that the safety and stability of the iron market, from the ore to the finished product, depend upon economic production and close profits. This is not a boom year, and all the various interests concerned in the market will have to agree upon a common policy. There must be cheaper ore, cheaper transportation by water and rail, cheaper coke, and, possibly, cheaper labor. It is thought that the last-named point will be the easiest to settle, as the skilled mechanics employed in the iron trades will much prefer a slightly lower scale, with steady employment, to a higher scale coupled with idleness. The ore men are willing to make every reasonable concession, and the vessel interests will, it is presumed, fall into line. The railway situation will take care of itself, the decrease in the freights serving as a convincing argument in favor of a reduction in the tariff, while the coke syndicate is at this time unpleasantly realizing the force of the long-standing demands at the hands of the furnacemen. Pig iron is to be had in plenty, at very low quotations, nearly every one of the furnaces that went out of blast having large stocks on hand that they are anxious to sell. Manufactured iron has dropped off a trifle, and both sales and prices are weaker in all the lines.

SHORT-SIGHTED CANADIAN MANUFACTURERS.

Probably the most universal trait of mankind is selfishness. It affects national policies no less than individual lives. Even common patriotism has to yield at times to this malign influence. Thus, there are a few manufacturers in the United States, comparatively a few, whose perception of the greatest good to the greatest number is so badly awry that they cannot view any great public question save through their own medium of self-interest. And even then, they are blind to their own best interests, for they fail to see that, were a system of public policy so readjusted as to be adapted to their own little circle of supposed necessities, it would not fit the needs of the great majority at all. There have always been enemies of a protective policy in the United States, even among manufacturers, and there always will be; but that does not alter the fact that adherence to this policy of encouragement to native industries has wrought marvelous changes for the better in this country, and that its abandonment would be a public calamity.

Canada, which is struggling for the establishment of a like policy, is now undergoing a similar experience. While the vast body of Canadian manufacturers are undoubtedly in favor of the present protective policy, here and there may be found a few men who are willing to lend themselves as tools to the opponents of protection. Thus, one manufacturer, who owns plants in both Canada and the United States, wants reciprocity, because it might benefit him individually, without regard to the interests of his fellow-manufacturers; another, who manufactures sewing machines, wants the duty on imported materials entirely abolished because he thinks it would benefit him individually, in spite of the fact that he has a monopoly of the Canadian market, and a third, who uses both American and Canadian-machine bolts in his agricutural machinery, wants the duty taken off so that he can get his bolts cheaper, whether it destroys a home industry or not.

We are not particularly interested in the promotion of Canadian industries, and have no doubt that American-made goods are sold in Canada very largely because of their superiority; but we cannot but perceive the selfish and short-sighted policy (considered from the standpoint of national advancement) of the manufacturers referred to.

EFFECT OF THE M'KINLEY TARIFF ON BRITISH TRADE.

Some very interesting figures have lately been given out by the British Board of Trade, regarding the effect which the new American tariff will have upon English trade. In round figures it is stated that the United States is "about to subject" an import trade of the value of about $400,000,000, "already bearing an import burden" of $160,000,000, to a "tax" of $205,000,000, or at the rate of fifty-two per cent. With regard to "metals and manufacturers of metals," the value of imports at present is some $50,000,000, and the present duties are $19,000,000. It is a matter of melancholy satisfaction to English manufacturers to learn that the chief duties of our new tariff affect only a small part of their foreign export trade, the total exports of British and Irish produce to the United States last year having been somewhat over $152,500,000, or not quite an eighth of such produce. Of the last mentioned total, the metals on which duties are largely increased amount in value of something like $30,000,000. The chief increase, as is well known, affects tinplates, of which Great Britain exported last year to the United States somewhat over $22,500,000 in value. The existing duty on this product is 34½ per cent. *ad valorem*, but the new scale of duties raises it to 76½ per cent. *ad valorem*. Another British export that will be unfavorably affected is cutlery and hardware, though some comfort is found in the fact that the United States only takes $2,000,000 per annum, whilst British manufacturers export altogether nearly $15,000,000 worth. Our friends abroad are certainly welcome to all the comfort they can get out of the present situation, though it must require a Mark Tapley temperament to extract very much of reassurance at the present writing.

CUBAN ORES IN AMERICAN MARKETS.

Regarding the probability of Cuban ores coming into competition with Lake Superior ores in markets now commanded by the latter, we are informed by a gentleman unusually well informed regarding Cuban enterprises that such a contingency is not likely to occur this year. The only company now mining and shipping iron ore is sending its entire product to two steel companies east of the Allegheny Mountains, and will continue to confine its shipments to the above works for some time to come. On the part of the other companies owning mining properties in Cuba, it may be said that a vast amount of preparatory work remains to be done, so that it is extremely improbable that any shipments will be made during 1891; and even when shipments begin, they will for the most part be confined to furnaces near the seaboard, at least for a considerable period. At any rate, our informant, upon whose representations we have every reason for relying, positively states that markets now held by Lake Superior ores will most certainly not be disturbed during the present year. This announcement will relieve the market of one element of misgiving, and will, no doubt, have a tendency to strengthen prices to some extent.

THE GROWTH OF OUR GREAT CITIES.

In the course of an article on the growth of American cities, *Bradstreet's* points out the significant fact that there are now twenty-eight cities in the United States, as shown by the census, which contain over 100,000 people, against twenty in 1880, and fourteen in 1870. This of itself is a notable circumstance, important alike to the manufacturer, the political economist and the humanitarian. Concerning the comparative growth of our cities, the journal in question says:

Among the largest towns, Chicago takes a decided lead in point of growth, its 1,099,000 inhabitants representing an increase of 119 per cent., making it the second city of the country, and displacing from that position Philadelphia, which had occupied the post since the census of 1820. Brooklyn, too, with a gain of 43 per cent, stands out among the large Eastern cities, though the phenomenal progress of Chicago crowds it from the third rank, which it held in 1880, to the fourth position. Cleveland, now the tenth city in point of size, gained 63 per cent. in its population in the decade, and Buffalo, the eleventh, has increased at almost the same rate, its percentage being 62 per cent. Pittsburgh's rate of growth was 52 per cent.; Washington's, 55 per cent. Detroit's, 76 per cent, and Milwaukee's, 77 per cent. The greatest proportionate gains among towns of 100,000 or more inhabitants are, however, shown by a number of cities, particularly those in the West, which now, for the first time, appear in a national census as having attained these dimensions. There are eight towns coming under this head: Minneapolis, Omaha, Rochester, St. Paul, Kansas City, Indianapolis, Denver and Allegheny. The leader of these in point of its rate of increase is Omaha, which has gained no less than 360 per cent. in numbers during the past ten years Minneapolis comes next, with 256 per cent, and is followed by St. Paul, with 224 per cent. Denver's gain is at the rate of 203 per cent., and that of Kansas City at 140 per cent.

The advance in population shown by cities below 100,000, but over 20,000, is quite as remarkable. From the figures presented, it appears that there are manufacturing cities in the East and South, and centers in the South and Southwest, which have risen to importance and developed population from the extension of railroad facilities. Fall River, McKeesport, Saginaw, Grand Rapids, Canton, Birmingham, Atlanta, Chattanooga and Pueblo furnish instances of the first class. Among the second class may be mentioned Dallas and Fort Worth, Wichita, Duluth and the Pacific cities. At the same time, there are certain towns which have shared in both these influences, notably Knoxville and Memphis in the South (Birmingham and Atlanta being to some extent in the same case), Topeka, Lincoln and Sioux City in the West, and Los Angeles on the Pacific coast. Enterprise, thrift and prosperity are characteristics of these growing young giants.

SOME six years ago an effort was made to establish in Cleveland the manufacture of seamless steel tubing. The process consisted in forcing a steel disk through a mandrel by hydraulic pressure, the result being an elongated shell, the ends of which, being trimmed off, produced the required pipe. For some reason or other, the matter fell through, and soon after the inventor died. We now learn that a company has been organized, mainly among Cleveland capitalists, for the purpose of manufacturing seamless steel tubes, at Shelby, Ohio. This is claimed to be the only company of the kind in the United States, the article being produced in England only. The tubes are to be used largely in bicycle manufacture.

"AFTER NATURAL GAS, WHAT?" asks the Cleveland *Iron Trade Review*. Clearly the answer is artificial gas. Enough is already known to make it certain that for heating purposes in all the larger cities artificial gas might be introduced with advantage. The waste in the consumption of coal for domestic and manufacturing purposes is one of the most serious extravagances of our times.—[Philadelphia Record.

Very truly said. And the inestimable advantages of natural gas over crude fuel have served to quicken the demand for a cleaner and more efficient fuel than coal, after natural gas has gone the way of all good things.

THE Chicago *Inter-Ocean* is cruel enough to describe it as the "*American Artisan, Tinner and House Furnisher*, a journal published in Chicago, for the purpose, we conceive after a very careful study of its columns, of proving that American artisans can do nothing, that American tinners should buy their wares from Great Britain, and that American house furnishers should buy nothing that is not 'Eng-

lish, you know,'" and suggests that it change its name to the *British Monopolist*. Again the *Artisan* will please accept marks of our distinguished considerations.

Our contemporary, *Iron Ore*, of Ishpeming, Mich., has shown enterprise in publishing the total output of Lake Superior iron mines in 1890. According to its figures the grand total is 9,038,939 tons. The totals for the different districts are as follows: Escanaba, 3,778,209 tons; Marquette, 1,251,531 tons; St. Ignace, 25,501 tons; Gladstone, 91,095 tons; Ashland, 1,618,296 tons; Two Harbors, 880,014 tons; by all rail, 681,158 tons. The table shows 96 producing mines in 1890. Norrie's total is put at 906,728 tons.

A WELL-KNOWN iron manufacturer takes exception, in a friendly note to the editor, to the statements set forth by one Nick Dale, regarding the alleged profits of the Pittsburgh iron and steel works in 1890. The article was somewhat hastily scanned before publication, but a more careful perusal convinces us that it is so largely sensational as to cause regret that, even by implication, we should appear to endorse its accuracy.

The Fifth Annual Edition of the Duluth *Daily News* quite eclipses all previous efforts and is worthy highest commendation.

STAND BY THE HOME MARKET.

Cheapness is the bait with which Free Trade attorneys seek to allure the great industrial classes to aid in destroying the home market by smothering it with importations from abroad. Between this time and the next National election, voters will have opportunity for investigating this proposition and all that its fulfillment implies. No question can arise in connection with the election of law makers in the proper decision of which our people have so much at stake.

Everything that we eat, as well as all that we wear, is the product of labor. In providing many of these, labor constitutes 90 per cent. of their cost, while the average will be in excess of three-fourths. Keeping this fact in mind, the man who depends upon his labor for his living needs no college professor to inform him that wages would have to stand the greater share of any reduction in cost to consumers. There can be no escape from this alternative.

Why can European countries produce some lines of goods cheaper than they can be made in the United States? Not because they can procure the necessary raw materials required in their manufacture so much cheaper, but because labor can be had there for one-quarter or two-thirds the price paid here in the same lines. It requires cheap labor to produce cheap goods in Europe, and cheaper labor will be necessary in this country to produce cheaper goods here, except as this end may be secured through improvements in machinery, equally open to both countries.

It is from this point of view that the issue between Protection and free foreign trade assumes an especial interest to the millions of industrial voters to whom Free Trade attorneys are now so earnestly appealing. If the prices of edible products are to be reduced, the remuneration of the farmer must be lessened. On the other hand, if clothing and household goods are to be supplied cheaper, the work involved in their preparation must be done by some body who will be content with lower wages than are now paid. If those now working in mines and shops and factories in the United States will not consent to this arrangement, there will soon be little work for them to do, for Free Trade will place many lines of goods upon the shelves of our dealers for less money than the same goods can now be produced for under the scale of wages paid in all the leading industries by United States employers.

All of which is well known to the Free Trade attorneys, who are careful to keep the fact to themselves while drumming up votes for their favorite policy. Meantime, those who are their proposed victims had best not close their eyes to facts patent to all who choose to look for them.—[Illinois Branch American Protective Tariff League.

Sad Condition of the Panama Canal

THE Panama Canal is actually a thing of the past, and nature will soon obliterate all traces of French energy and money expended on the Isthmus. Reports of October 25 say that the late heavy rains have caused slides into the canal from the hilltops near Obispo, and the canal excavations at Circaracha is entirely filled up. Only one dredge of the American company now remains at Colon, the Nathan Appleton. The dredge Ferdinand Lesseps, of the same company, was sunk about 60 miles from Colon, while being towed to Greytown. Lieut. N. B. Wyse, acting for the Panama company, writes from Bogota, under date of October 20, that owing to the exacting terms sought to be imposed by the Senate committee, "it appears that it will be impossible to reach an understanding."

A Handsome Tribute.

The Iron Trade Review, of Cleveland, issued a special edition, in an illuminated cover, on December 18, which is a most creditable production. It contains a number of special articles on topics connected with iron, a very valuable one in particular being on "Upper Lake Ports," and their facilities for handling iron ore and coal. The *Review* certainly fills a long-felt want in trade journalism, for it has had a remarkable growth during the past four years, and now ranks with the very best journals in the United States in its special field.—[Toledo (O.) Blade.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

January 1, 1891.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	In Blast. No.	In Blast. Week'y capacity.	Out of Bl'st. No.	Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	In Blast. No.	In Blast. Week'y capacity.	Out of Bl'st. No.	Out of Bl'st. Week'y capacity.
New England	14	5	803	5	398					
New York	9	2	243	7	847	6	2	1,720	4	2,781
Pennsylvania	14	6	551	8	426	1	0	0	1	600
Upper Susquehanna Valley										
Pittsburgh						24	21	28,581	3	4,313
Spiegel						1	1	560	0	0
Allegheny Valley						1	0	0	1	930
Shenango Valley						17	11	7,791	6	5,510
Youghiogheny Valley						4	1	894	3	1,012
Juniata and Conemaugh Valleys						19	12	6,249	7	2,602
Spiegel										
Maryland	7	3	256	4	488	6	2	2,775	4	700
Virginia	11	3	174	8	515	13	11	5,049	2	1,127
North Carolina						1	1	100	0	0
West Virginia	2	0	0	2	130	6	2	1,956	4	1,781
Ohio—Mahoning Valley						15	8	6,786	7	5,901
Eastern, Central and Northern						17	15	12,865	2	1,337
Hocking Valley						14	4	1,513	10	2,707
Hanging Rock	12	4	240	8	841	13	9	2,012	4	739
Miscellaneous										
Kentucky	1	0	0	1	95	5	3	839	2	720
Hanging Rock										
Western Region and Miscellan'ous										
Tennessee	8	5	1,133	3	325	12	9	4,788	3	1,276
Georgia	3	0	0	3	379	2	2	1,262	0	0
Alabama	14	9	2,006	5	1,035	37	12	8,047	25	15,295
Indiana						2	2	376	0	0
Illinois						14	11	12,796	3	2,877
Michigan	22	12	3,925	10	2,676					
Wisconsin	5	4	2,673	1	120	4	3	2,571	1	422
Minnesota						1	0	0	1	140
Missouri	2	2	557	0	0	5	0	0	5	3,764
Texas	2	1	260	1	179					
Oregon	1	1	238	0	0					
Colorado						2	1	319	1	350
Utah										
Washington	1	0	0	1	205					
Total charcoal and coke	128	67	12,459	67	9,262	242	143	109,870	99	57,484
Total anthracite	162	102	41,952	60	19,316					

SUMMARY.

FUEL.	In Blast. Number.			Weekly Capacity.			Out of Blast. Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	61	72	67	12,459	13,459	12,963	67	74	9,262	9,578
Anthracite	102	104	111	41,952	44,107	41,196	60	68	19,316	19,844
Bituminous	143	169	167	109,870	123,886	120,345	99	75	57,484	35,749
Total	306	345	345	164,281	181,452	175,272	226	217	86,062	65,171

A New Cylindrical Steel Car.

A cylindrical car all of steel is now on exhibition at the Lake Shore station, in Chicago. It was begun, a few years ago, at the Atlantic Works, East Boston, by a poor inventor, who had not money enough to finish it, and parts of it were consigned to the scrap heap. Messrs. Bird & Atkinson afterwards took it up, and it was completed in Laconia, N. H. The car is made in the form of a cylinder, about 53 feet long by 9 feet 9 inches in diameter, and is carried on two four-wheel trucks. A plan of hot air heating is used with two furnaces under the car. The segment formed at the bottom of the car by the level floor supplies a very good chamber for the hot air pipes. The ventilation of the car is excellent. Fresh air is freely admitted through shafts from the top of the car down between the windows, and is heated by passing over hot pipes, and flows up through registers in the floor. Ample escape is also afforded for the vitiated air at the top of the car. A simple device admits the opening and closing of the dampers of the furnace from either platform. The disposition of the room inside the car is good, and well adapted to a private car. The cylindrical form is more apparent from within the car than from without, the ventilators, windows and platforms detracting much from the symmetry of the outside. The entire car, ceilings and sides are carefully and elaborately cushioned, and, it is claimed, were the car to be overthrown, the passengers could not be seriously injured. This point cannot be conceded, however, as the large windows of glass at either side, wholly without protection, would cause trouble in a wreck. The middle compartment is arranged with a narrow isle at the side and transverse seats, after the European style; at one end is a small apartment for three persons, at the other a very attractive sitting-room accommodating 15 to 20 persons comfortably. The cost of the car was said to be about $40,000, up to September, 1889. A considerable number of these cars could be produced for a less cost for each.—[Railroad Gazette.

WE have to apologize to our highly esteemed exchange, *The Iron Trade Review*, for not having sooner complimented it on the superb special holiday edition with which it surprised and pleased its many admiring friends last month. It was filled with valuable information, regarding the enormous traffic of the Great Lakes in particular, was profusely illustrated, and altogether was one of the handsomest and most creditable editions ever gotten out by a trade paper. That the *Review* is appreciated is attested to by the liberal patronage bestowed upon it by advertisers.—[Ohio Valley Manufacturer, Wheeling.

AFTER exhaustive experiments the French postoffice has decided to substitute a copper-coated steel wire in place of the ordinary iron wire for telegraphic and telephonic service.

IRON A DEPENDENT PRODUCT.

If iron really occupied a commanding position in trade this would not be the case. It would have an intrinsic value that could not be so easily affected. It would govern values and preserve at least some appearance of stability. But it is only a dependent product. The magnificence of its growth, shown in recent statistics, is but a reflection of the enormous requirements of other lines of trade. The more they grow and the better they prosper, the more rapidly grows the iron trade. New furnaces and new mills find their product readily absorbed when the country is prosperous, and a fictitious feeling of strength is imparted to iron manufacturers. With a brief opportunity to control prices they can easily deceive themselves with the thought that the balmy days of prosperity are more or less permanent. But iron is neither food nor clothing, and when activity ceases in the building of new railroads, or the equipment of countless factories with new machinery, or the building of hundreds of new towns, or the supply of farmers with new implements, down goes the demand for iron, and the price suffers. It is a valuable adjunct to civilized man, but it is not indispensable to his existence, and it is, therefore, in every sense a dependent product and not a commanding one.

If iron were anything but a dependent product how easy would be the recovery from dull times in general trade. All that would be necessary would be the starting up of more furnaces and mills and the employment of more and more men in the production and manufacture of iron. This is a point on which projectors of new iron works in sparsely-settled districts, far from centers of industrial activity, are apt to go astray. They can easily figure up the possible cost of the production of iron on the spot, and they can also calculate just how much the work when in operation will benefit the locality, but the disposal of the product made is a subject left open for the exigencies of trade to settle. "Iron is iron, always needed by some one, and it can always be sold," is the argument of the projector of a new blast furnace in the woods which is to make iron at marvelously low cost. But iron will not always sell itself, and there are times when it "goes begging" in centers of greatest consumption. Probably no other commodity fluctuates as readily as iron in sympathy with the condition of general trade. Groceries and dry goods, farm products and textiles generally are governed by wholly different influences, and may be dear in bad times and cheap in good times, but iron moves along with general business, cheapening when it droops and advancing when it revives, but governing nothing as a rule. It is for this reason that the iron trade is such a good indicator of the condition of general business. It has all the qualifications of a barometer, being sensitive to every variation in the atmospheric or business pressure, and quickly responding to the changes made by a difference in the direction of the wind.—[Metal Worker.

Ribbed Boiler Tubes.

A new style of boiler tube has lately been brought out that has radical projections on the interior of the tube, for which is claimed greater evaporative efficiency that can be obtained from the plain tube. The projections on these tubes present greater heating surface and, as has been shown by a test, more water can be evaporated per pound of fuel than by the use of plain tubes. In one case the evaporative efficiency was nearly 10 per cent. greater. The projections being on the inside of the tubes will have a tendency to obstruct the draft, but this, it is claimed, baffles the gases and allows more time for the transmission of the heat to the water. That may be a point in their favor, but we think that when it comes to cleaning the tubes a difficulty will be met that will amount to more than any gain to be found in the greater evaporation shown while the tubes are clean. Really, it would seem that with soft coal as fuel the tubes would soon become so coated on the inside that their efficiency would be reduced below that of a plain tube that could easily be kept clean. That there is a greater transmission of heat through plates that have metal projections has been shown by experiment years ago, and for boilers it does not matter particularly whether the projections are on the fire or water side of the sheet so long as they remain clean. But there is where the difficulties arise in practice. If the projections are on the fire side they burn off, on the water side they become coated with non-conductive scale; at least that has been the experience in the past, before the days of boiler purgers and mechanical boiler cleaners. The idea of putting the projections on the tubes is new, but we consider it a mistake to put them on the fire side, because of accumulation of soot which is even a worse conductor of heat than boiler scale of the same thickness. But then the mechanical difficulties in the way of the use of tubes having projections on the outside might be too great for mechanical ingenuity to overcome in a practical manner, but seemingly not more so than providing a practical flue cleaner for such tubes as have inside projections. It is possible that the new tube may become a success, but we doubt it.—[Stationary Engineer.

Modern Horse-Power Development.

It is a very easy matter to talk about 18,000 or 20,000 horse power, but few persons realize what it means or the enormous force that it exerts. The new White Star steamships, for instance, or the Iuman Line's City of New York develop from 18,000 to 20,000 horse-power. They have twelve boilers and 72 furnaces, worked with forced draft. Assuming that the engines will require 18 pounds of steam per horse per hour, then 160 tons feed water must be pumped into the boiler every hour, and 160 tons of steam will pass through the engines in the same time. In 24 hours the feed water will amount to 3 840 tons, occupying 138,240 cubic feet. This amount of water would fill a length of 493 feet of a canal 40 feet wide and seven feet deep. Taking the condensing water at 30 times the feed water, it will amount to 4 800 tons per hour, or 115,200 tons in 24 hours, or for a six-day transatlantic run, not less than 691,200 tons, or 24,883,000 cubic feet. This amount of water would fill a cubical tank 295 feet on the side—a tank into which the Roman Catholic Cathedral, steeples and all, or the *Times* building, could be put and completely covered up. The coal consumption is not less interesting. Four hundred tons a day are used on the 20,000 horse-power. This would fill 400 wagons. It requires for its combustion 8,609 tons of air, occupying a space of 222 336 000 cubic feet. It is impossible to put these figures in a shape such that they may be grasped by the average reader, but enough has been cited to show, nevertheless, that the circulating pumps and fan engines of such ships are a hard-working lot.—[The Iron Age.

IRON SLAG IS VALUABLE.

At Boonton (N. J.) Iron Works, the piles of refuse from the mills increased. High embankments of cinders surrounded the works, and it became a problem how to dispose of this supposedly useless material. As the township laid out roads, this slag was carted into the country and used for filling in or for road-beds. The result was that for miles around the iron slag became part of the soil, and is still mixed in with the clay and slate that compose the earth. It was considered a nuisance by the owners, and they were glad to get rid of it.

To-day the great heaps of slag have a commercial value that is constantly increasing, and the price of Boonton slag promises soon to be quoted in the iron market of the country. The discovery that it had value is of comparatively recent date. The old furnaces were shut down for years, and it was only after the works were started up that the slag was found to have commercial value.

Two years ago some New York capitalists began an investigation into the merits of the Boonton slag, with a view to using it as a base in the manufacture of paint. The Boonton slag was subjected to careful analysis by Professor Ricketts, of Columbia College, and Professor Austen, of Rutgers College. These chemists reported that the slag was very rich in iron, containing from 55 to 70 per cent. of pure oxide. They also discovered that in this slag the particles of iron were encased in particles of silica or glass, which added to its value and had prevented the slag, much of which had lain for over a century, and had been subjected to every kind of weather, from corroding.

On the strength of these reports, a company was organized, and buildings were leased, machinery introduced, and the manufacture of paint begun. The product has been a marked success, and it is working a revolution in the paint trade.

Furnace and rolling mill owners were astonished to find as much, and often more, iron in this refuse material than they got out of their native iron mines. Instead of going to the trouble of mining the ore, here was an inexhaustible supply lying around which could be worked into merchantable products for less than the ore could be mined for per ton.

That this discovery is considered of inestimable benefit to iron men is best shown by the fact that the Pequest Furnace Co., at Oxford, Warren county, sent in an order, a few weeks ago, for 10,000 tons of the slag, and it is being dug out and shipped at the rate of 1,000 tons a week. The paint company has already sold 2,500 tons, and nearly 50 men are daily at work loading and delivering the product.—[Engineer.

Benner Again to the Front.

Samuel Benner, the Ohio farmer, whose predictions in the past regarding the interests of the country, the grain and iron markets, stock speculations, etc., have in some instances come close to the market, and in others, notably those respecting the iron trade, been away off, has come to the front with a fresh lot of prophecies for the year 1891, which are in substance, as follows:

There is a wide difference between a yearly panic in money, and a periodical trade panic.

The November, 1890, panic was a premature financial disturbance to fulfil the predicted panic of 1891. It will soon subside.

Inflation in iron and stocks, wild speculation in trade and over-expansion of credits are essential to a panic, and these did not exist in November.

There is no good reason for revulsion in trade in this country at this time. The McKinley tariff, the Silver bill and Treasury disbursements forbid.

He predicts: An end to tight money this Winter; business and prices will improve under the McKinley tariff, and in the South especially. We shall have a short boom in 1891.

Corn and pork will advance to high prices in October.

Inflation and activity in iron will culminate in the Fall, and general prices will droop.

The McKinley tariff is the mainstay of industry, and it will give trade confidence this year.

Business is in a prosperous condition, and there is plenty of money. We must have changed conditions before the periodical revulsion in trade comes.

Mileage Tickets on the Pennsylvania Lines.

On and after January 20th, 1891, individual and non-transferable one thousand mile tickets, good over all divisions of the Pennsylvania System, west of Pittsburgh, will be sold at rate of two cents per mile, or $20 each, by line agents at principal points. All forms of mileage tickets heretofore issued for the Pennsylvania lines—still unused and unexpired as to time limit—will be honored on and after above date, on all roads operated by either the Pennsylvania Co. or the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Co., and only one thousand mile tickets will be thereafter sold. E. A. Ford, General Passenger Agent.

OUR contemporary, *The Iron Trade Review*, of Cleveland, is to be congratulated on its handsome holiday number, last month. The colored lithograph cover bearing the inscription, "Iron is King," is very handsome, and the reading matter furnished is more than usually interesting.—[Dixie, Atlanta, Ga.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

A second cave-in occurred at the Norrie mine January 10. Quite a section of ground west of the former cave went down, taking with it a spur track of the Lake Shore road and several ore cars. It was anticipated, and, as the men had been taken from that portion of the mine, there was nobody hurt by the giving away of the ground.—[Florence Mining News.

MENOMINEE RANGE.

The Bessemer *Pick and Axe* has several times expressed the belief that the several iron ranges of the Upper Peninsula were all connected, the Gogebic being, so to speak, the "consolidation" and continuation of the Marquette and Menominee ranges. The belief of the practical unity of at least two of these ranges appeared to be shared by many who have given the matter some attention, and among those is the correspondent of the Wausau *Torch*, who writes as follows to that paper: "Exploring on the extreme eastern end of the range is being renewed quite actively. That section was pretty well abandoned three years ago, and the general impression seemed to be that the ore deposit petered out with the eastern portion of the Colby mine. But the recent and important finds at Sunday Lake, Pilgrim, Eclipse and other properties east of Wakefield, have proven, beyond doubt, that as yet the eastern limit of the range has not been found. The probability rather seems to be that that the Gogebic runs into the Menominee, or that the two are in reality but one. On this theory, there is yet a vast stretch of territory, between Wakefield and Iron River, that is entirely unexplored, and there is still ample room for fortunes to be made or unmade in delving after the hidden treasures."

There is a probability that the South Mastodon mine will be leased to Capt. C. T. Roberts and others, a proposition to that effect having been made by Edward Blake and the other owners of the property, and is now under consideration. The South Mastodon is situated on the north half of the southeast quarter of section 13, 42-33, and within a stone's throw of the Mastodon mine. During the past season the property has been quite extensively developed, and never was in better shape than it is to day, and with Capt. Roberts in charge, it will make a big showing. Should the property be leased, a larger plant of machinery will be added, and several other important additions made.—[Diamond Drill, Crystal Falls.

MARQUETTE RANGE.

Work is progressing steadily at the Barnum mine. At present the usual force is not employed, as the places of those who take a vacation about this season of the year are not filled by new hands, as is generally customary during the busy season. The only shipments made from the mine at present is to the Iron Cliffs Furnace, at Negaunee. We have been told, and which comes from good authority, that the usual life and activity will soon be noticed about the workings of nearly all the mines in this district.—Peninsular Record, Ishpeming.

The Riverside property, which is about four miles from Republic by the wagon road, and about three miles by straight road from Republic, is looking well, and the property is destined to become a large iron ore producer some day. At present there are 22 men at work on this property, with the possibility of putting six more miners at work within a few days, or just as soon as room can be made for them at the bottom of the shaft. A vein of black ore, 15 feet wide, has been encountered, which is being worked full size. Breast stopes are being worked each way ten feet high, averaging from 100 to 120 buckets every 24 hours. Several of our citizens are interested in this property, and we hope it will prove to be a bonanza to them.—[Peninsular Record, Ishpeming.

The East New York is doing prospecting work with the diamond drill, looking for other bodies than those now wrought. We hear that the mine is looking well, and gives promise of sending out a healthy product this year.—[Florence Mining News.

The drill boring of the Lucky Star has reached a depth of 300 feet, and is in paint rock. The formation is one similar to that overlying the ore in this section, and because of this the company is satisfied that they are near the long-sought bonanza.—[Florence Mining News.

The shaft being put down on the southeast shore of Lake Angeline is now down to the first level, and drifting to meet the tunnel being put in from the shaft at the north side of the lake is in progress. There is only about 400 or 500 feet yet to drill through to join the ends of the tunnel, when one can walk under the lake from shore to shore. The entire distance will be something like 1,500 feet. We believe it is the intention to do all hoisting of ore from the shaft upon the north side of the lake.—[Iron Ore.

The Republic Iron Co., working in the Michigamme district, three miles south of the Mansfield mine, is showing up a big thing. The company have explored quite extensively here, and have now shown up a grade of ore entirely different from any mined hereabouts, which is the genuine Republic quality, and runs Bessemer in iron. A working shaft 6x8 feet encountered the ore when it had been sunk nine feet, and now they are down into over 24 feet of the mineral. Capt. Alex Lenshek has charge of the work, which is now being done with nine men.—[Diamond Drill, Crystal Falls.

VERMILION AND MESABA RANGES.

One of the most promising iron properties on the Vermilion range is the exploration of the Chicago & Minnesota Ore Co., of which Capt. Joseph Sellwood is manager, the northeast quarter of the southeast quarter, section 10, 63.14, and which is to be known as the Pengilly Mine, named after Captain John Pengilly, of Ely. The *Iron Journal* gives some interesting information regarding work on this property. The main shaft is now down 104 feet and has gone through good ore nearly the entire distance. At the 50-foot level crosscuts and drifts have been driven for over 300 feet, extending both east and west, and with a few exceptions are through fine ore. One peculiarity to be noticed most particularly at this level, is that in some portions of the drifts the ore is of the hard grade, resembling somewhat the Minnesota, while in other parts it is granular like the Chandler and easily crushed. At the end of the western drift, a 40 foot winze has been sunk and continued in good ore. At this stage of the development, enough good paying ore was insured to warrant the sinking of a permanent shaft, and according from the 50-foot level to the 104, a double shaft, 7x10 feet in the clear, is to be found. The first done here was to drive a crosscut 22 feet south, which is entirely in ore. About 16 feet from the bottom of the shaft two drifts have been started, one east and one west. All work done so far in the process of development has been prosecuted only with a view of ascertaining the extent of the ore deposit, and no particular effort has been made to get out any quantity of ore, although on the surface there is to be seen, 1,100 or 1,200 tons of ore, necessarily taken out in the course of development.

Another New Iron Mine in Minnesota:—

A special dispatch to the Duluth *Herald* from Grand Rapids, Minn., says: A very rich iron mine has been struck near here. The find is extremely rich and surpassed the highest grade of ore taken from the Gogebic mines on the south shore of Lake Superior. It is of the same nature as that ore, differing in this respect from that of the Vermilion range. A spur track will at once be constructed from the Duluth & Winnipeg to the mine. This discovery causes excitement here.

The Nicaragua Canal.

Few persons who have not made a careful investigation would think it is farther from San Francisco by way of Cape Horn to New York than from San Francisco by way of Cape Horn to Liverpool, yet such is the fact. The former distance is 14,840 miles and the latter 14,690 miles. If the Nicaragua Canal was completed the relative distance would be reversed; that is, the water route from San Francisco to Liverpool would be 7,694 miles, while to New York it would be but 4,946 miles. The saving in miles from San Francisco would be, to New York, 9,894 miles; to Liverpool, 6,996 miles. The advantage would thus accrue in greater proportion to our country's Eastern coast line than to European ports, although both would be greatly benefitted. At the same time the advantage to our extreme Western States would be equal to that of both our Eastern ports and European ports. So the canal is essentially important to our country.

After thorough and elaborate caluculations the Secretary and Treasurer of the Nicaragua Canal Co. estimates that the total of tonnage that may reasonably be anticipated for the canal when it is finished in 1897 will be 7,000,000 of tons, or more than was transported over the Suez Canal in 1888, for which the Suez company received in tolls and from passengers a total of $12,975,315, while the total expenditures for administration, operation, maintenance and repairs were only $1,207,058 But the same authority also estimates that the total of trade naturally subsidary to the Nicaragua Canal, after its opening, will be 21,459,620 tons annually.—[Seaboard.

Progress of the World's Fair.

The World's Fair "he do move," as the Rev. Mr. Jasper remarked of the sun. The organization in Chicago has found permanent quarters in the Rand-McNally building, on Adams street; the director-general is in the East stirring matters up, plans and specifications are being prepared for the mighty architectural undertaking, and Representative Butterworth has introduced into the House of Representatives a resolution requesting the President of the United States to invite the several States and Territories to hold suitable memorial services on the 12th day of October, 1892, commemorative of the 400th anniversary of the discovery of America, and that they and each of them cause to be prepared a statue, painting, tablet, or other suitable memorial, illustrative of the resources, progress and development of such State or Territory, and that such memorial be placed on exhibition in a group with those from the other States and Territories during said Exposition. By early Spring active building operations will have been commenced, and Chicago will begin to feel, and that in a tangible way, the effects of the great Exposition. For three years to come business will boom in Chicago.—[Chicago Journal of Commerce.

This Is All Right.

The Iron Trade Review has its Jeremiah clothes on. In its issue of January 1 (which came to hand only on the 10th), it says:

"The ore outlook for the coming year is the worst possible. The prospect at this time points to a late opening of sales, a falling off in production and lower prices."

It is not flattering, so much must be admitted, but it is not difficult to imagine worse. Ore producers of this peninsula are nearly all strong enough to endure the stress, and "come up smiling" when it is over. If the market wants less ore next season, they'll mine less; and unless the market will take what it wants at a price they can live by, they'll let it lie in the ground until it recovers sufficiently to do so. That, at any rate, is how the men we meet forecast the season.—[Iron Port, Escanaba, Mich.

The McKinley Tariff and Sheffield Trade.

The quarterly returns compiled from official information, as to exports from the Sheffield district to the United States of America, prove that the cutlery manufacturers of that town have been very severely hit by the largely increased duties imposed upon the McKinley Tariff Act. The total value of cutlery shipped from Sheffield during the last three months of 1890 was only £28,178, as compared with £74,970 in the previous quarter, and £62,350 in the corresponding quarter of 1889. These are comparative decreases of 62 and 45 per cent. respectively.—[London Iron and Coal Trades Review.

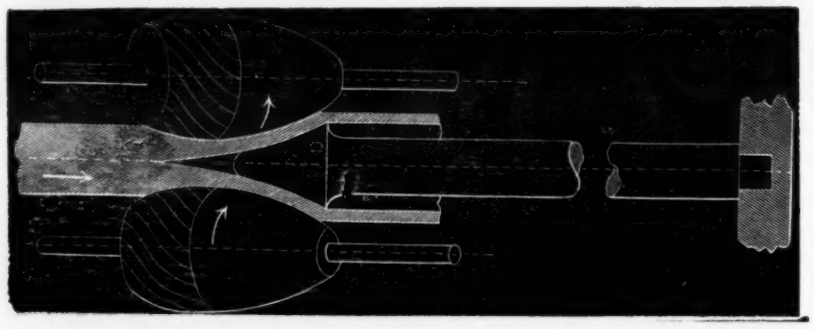
ROLLING SEAMLESS TUBES.

In a previous issue of *The Iron Trade Review* we gave an account of the Mannesmann process of rolling tubes from solid bars. Considerable interest in this subject has been felt by the engineering world ever since the process was first proposed. From *The Locomotive* (to whose courtesy we are indebted for the use of the cut) we take the following article, which is substantially the same as an address delivered by Mr. Frederic Siemens, C. E, before Section G of the British Association, some time ago. It may be well to say that we have not seen the process in operation ourselves, so that we cannot give as satisfactory a description of it as we would like to.

Most engineers will have heard of the tube-rolling process of Messrs. Mannesmann, whose modest title barely indicates its great importance. Tubes occupy an important place in the wants of mankind, for in addition to their use as tubes, properly so called, they possess, also, the most advantageous form for columns, rods, axles, bearers, struts, etc. A given quantity of material can be formed into no other shape so strong as the tubular. Mr. Siemens took an interest in the invention, because he was desirous of increasing the use of open-hearth steel, which, as well as copper, is particularly adapted to the process, wrought iron being comparatively unsuitable.

Hitherto steel tubes could only be made with difficulty, and at high cost, by a complicated process, and even then they had imperfectly welded seams and a longitudinal fiber. Now, from a rough ingot of cheap steel, with one, or, at most, two operations, a perfect tube without seam and with a circular fiber is produced. It may be seen from this bare statement how great is the importance of the invention. If it is considered that by the process in question tubes of great length and diameter, and of almost any desired thickness of metal, can be produced at a comparatively low cost, air-tight, and possessing three or four times the resisting power of the best welded tubes of wrought iron, it can hardly be doubted that a great future is opened out for their use in technical arts and industries, in architecture, and in the manufacture of implements of warfare.

At present, when we roll a bar of iron, we pass it endwise between a pair of rolls turning in opposite directions. Grooves are cut around the rolls of the sectional form desired in the finished bar, and the bar is forced into these grooves. The rolls do not make the bar revolve. They act simply on its



surface, drawing the material forward and forcing it into the prepared grooves at the same time that they lengthen it and reduce its sectional area. The fiber produced in the finished product is, of course, longitudinal.

Another way of rolling is known, and is used for straightening and polishing bars. Two or three rolls, running parallel to each other, or nearly so, are used, and the bar is introduced in the direction of their axes, instead of perpendicularly thereto. In such rolls the bar is not drawn forward, but simply rotates. It is elongated if sufficient pressure is used, but no decided fiber is produced.

The Mannesmann process occupies a sort of intermediate position between the two. Two (or three) rolls are used, as shown in the cut, but they do not lie parallel to one another. Their axes form acute angles with one another, and with the bar lying between them. When thus set, the rolls act on the bar to draw it forward, as well as to make it revolve, or, in other words, they impart to it a spiral movement. Though constructively both systems of mills may appear much the same, they differ widely in their mode of working, and in their results. This arises from the position which the article acted upon, and which we will continue to call a bar, is made to take up, and the very different action and form of the rolls In the Mannesman machine a certain relation is maintained between the forward movement of the bar, and its rotating movement, and if the proportion between longitudinal and rotary motion is properly adjusted to the special material acted on, the displacement in the substance of the bar is regulated so that a systematic twist is given to the fiber, by which not only irregular breakage of the material is avoided, but an energetic working action is secured, causing the great strength and toughness the tubes produced by this process are proved to possess.

The old straightening and polishing machine, although outwardly similar to the Mannesmann tube-rolling machine, owing to the form and position of the rolls and bars, admits of no twisting and displacement of material, and consequently this machine confines itself to surface action, as, indeed, it professes to do by its title.

The following remarks may assist in clearing up this singular difference, and explain the peculiar action of the Mannesmann rolls, which, while acting on the outer surface of a solid bar, produce a regular hollow space inside the same—in short, a tube. To obtain a simple, forward spiral action of the bar, the length of the rolls is immaterial; it will take place when the rolls are reduced to the form of thin disks. Supposing the disks to be infinitely thin, or, what is the same thing, that their outer edges are reduced to a mathematical line, and no sliding motion takes place, the bar must still move forward spirally, its spiral velocity being equal to the velocity of the outer circumference of the disks. If, instead of one pair of such thin disks, several pairs of disks of regularly increasing diameters are made to revolve on the same axis, the outer circumference of each disk will revolve with greater velocity than that of the preceding one. The same bar is, however, drawn forward through the several pairs of disks, and thus, as each part of the bar enters successively a more advanced pair of disks, the velocity with which that portion of the bar rotates increases, and it is drawn forward by each succeeding pair of disks, as they catch hold of it, with ever-increasing speed.

It will be understood that when a bar passes through such a series of disks, no slipping being possible, the material of which it is composed cannot retain its original area or volume. The diameter of the bar being regulated by the disks, while simultaneously a violent stretching action is carried on, the material required can only be drawn from the inside of the bar, and thus a hollow space is formed.

Instead of this peculiar arrangement of disks a conical, or rather conoidal, pair of rolls, which amount to the same thing as the disks, considered as joined together, may be provided. It follows that a bar or rod of suitable dimensions which is passed through the Mannesmann rolls will, provided its substance is sufficiently homogeneous and plastic, undergo a violent twisting and stretching action, the fiber being spun as is the fiber in the rope, on account of which the process may appropriately be called a torsional one. The bar in its passage through the rolls is twisted as thread is twisted in a spinning machine. As, however, it cannot be fed from the outside as is the thread, and as has been said, the diameter cannot be reduced on account of the action of the rolls, it is forced to draw on the interior for a supply of material. Let us attempt to explain in another way.

The tube is made thus: A bar is placed between the conoidal rolls at the part where their diameter being least, the speed at which they move to make a revolution is also least. The rolls seize the bar and draw it into contact with parts of the cones which move more and more rapidly, though, owing to the way in which the rolls are set, the space left between them for the passage of the bar decreases slightly. Slight, however, as is this decrease in the space between the rolls, a certain amount of material has to be shifted. The action of the rolls prevent this material from being taken from the outside of the bar, and consequently it is drawn from the interior—hence the hollow, hence the tube. Soon after entering the rolls, a small central fracture is formed which widens out to a hollow space as the increased stretch is made to take effect in an increased twist acted on from the surface.

The increasing twist of the fiber of the bar while passing through the rolls and the peculiar relation kept up between longitudinal and turning action is the characteristic of the Mannesman tube-rollingmachine, and it is this action that enables it to make a tube from a solid bar or ingot.

Though the bar is thus converted into a tube by the action of the rolls, and their action only, a mandrel is generally used to finish and smooth the interior and enlarge the tube. This use of the mandrel has led to the erroneous belief that it is essential to the formation of the hole. No machine, however, could stand the strain if it were attempted to force a mandrel longitudinally through a solid bar of hot steel. Such an operation is impossible. Just sufficient power is used to form the hollow in the bar from the action of the rolls on the outside, and into this hollow the mandrel enters, smoothing the inside, and, when required, enlarging the tube. Thus we have strange experience in rolling that by one operation the bar is made hollow and also longer and wider than when it entered the rolls a few seconds before.

In a specimen exhibited by Mr. Siemens there was proof that the hollow in the interior of the bar is formed without the intervention of a mandrel. The piece referred to was obtained by interrupting the action of the rolls while the bar was still on its way through them, and breaking off the bar so as to expose that part where the hollow is just commencing to form. The piece was sound in its solid part as well as in the hollow part, and the inner surface of the commencing tube was crystalline. This shows that no mandrel could have acted on it. Besides this, the inner surface was not oxidized, as it would have been if it had been exposed to the air at a red or white heat. The bright surface was preserved because no air could enter the tube during its formation. Until such a specimen is cut open, a vacuum exists in the interior, both ends being hermetically closed. Such a specimen is made by slightly pointing the bar at the two ends, so that they escape the full action of the rolls at entry and exit.

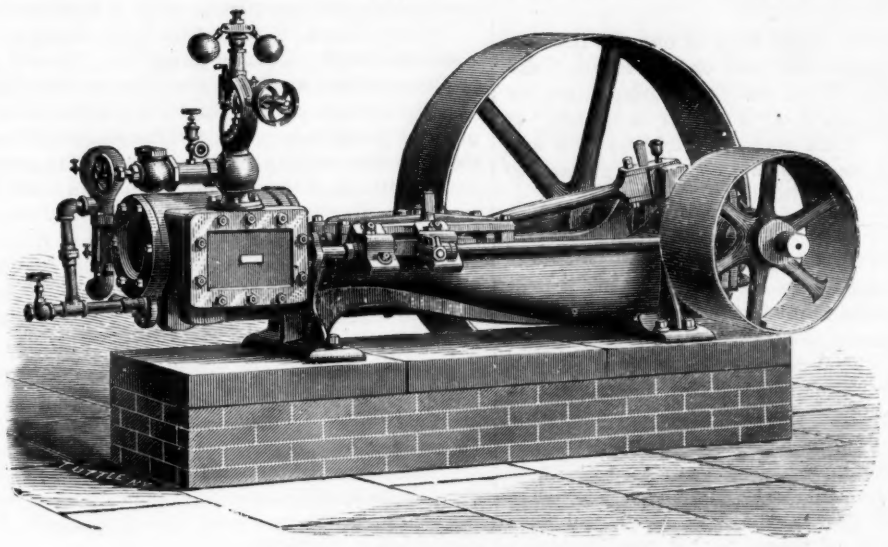
This curious result can always be obtained, and it quite disposes of the allegation that the hole is made by a mandrel. The specimen showed also both how the tube in the center commences by a fracture of the metal and widens out, and also the twist of the fiber, which had the appearance of a rope. This peculiar twist of the fiber assists in giving the tubes their great toughness and resisting power. The various specimens exhibited by Mr. Siemens were mostly produced from the relatively cheap open-hearth steel. The Mannesmann process in shaping metals upsets most of the hitherto accepted ideas and conditions, inasmuch as, instead of avoiding any twist of the fibers, it by one operation gives the greatest possible twist to the fiber with a corresponding stretch of material. Moreover, as has been said, it may, assisted by a mandrel, increase the outer diameter of a bar instead of diminishing it, as do all other rolling mills. The tube produced by the Mannesmann process is generally greater in diameter than the bar from which it is formed. The child is at its birth larger than the parent.

From the description and facts here attempted to be given, it is evident that we have in the Mannesmann process a system of rolling as new as it is capable of producing effects hitherto not contemplated. In combining all the various systems of rolling described above, it may claim to be called the universal system of rolling, in which all hitherto known rolling processes represent a part. The old polishing and straightening machine could never, it is evident, produce like results, because the essential constructive conditions are wanting. "It is remarkable," said Mr. Siemens, "that competitors and otherwise competent men rejected the Mannesmann process as either not new or as being wrong in principle and generally impracticable, and this

sweeping condemnation was supported by arguments apparently logical and sound. I trust this short explanation of an intricate and novel process, and I may say principle, of rolling tubes from solid ingots may assist in dispelling the incredulity and prejudice that has grown up around it. In face of the numerous possible applications of the process, great difficulties may yet have to be mastered, but it may be safely foretold that these will mostly be overcome on account of the true principle on which the process is based and by the energy and intelligence that have conducted it to its present advanced state."

A NEW ENGINE.

The engine herewith shown has been built from entire new patterns, with the latest improvements. Special attention has been paid to making all parts plain, simple, strong and durable; all the wearing surfaces are unusually large. The material throughout is the best, and the engine well made with the latest improved machinery, thereby securing accuracy and durability. The frames are strong and well shaped. All the cylinders have hot air jackets, which decrease the condensation in cylinder. The arrangement of the steam chest and steam ports is such that all the water forming in the cylinder is readily carried off, the ports extending below the bottom of cylinders, and the heaters being still lower, a perfect drainage is secured; the heaters are independent of the frames and all the pipes are easily accessible. The pumps are large and simple, firmly secured to cylinders and unable to get out of alignment; they are provided with large air chambers and brass valves and seats, which can be readily taken out and replaced while the engine is working at full speed. The center cranks are large and made of solid forgings and are not liable to break. The pistons are fitted with self-adjusting steam packing rings, and do not require any attention nor do they cut the cylinder; they are a great improvement over any other kind of packing. The connecting rods are of the most substantial character—of wrought iron, with straps, bolts and keys to take up the wear of the brass boxes. The governors regulate the speed of the engine perfectly; they are provided with "speeders" to change the speed of engine while in motion, and also a hand lever attachment to the valve, which is convenient for controlling the speed of engine when a uniform speed is not wanted, as when sawing, for instance. The general design of the engine is neat and compact. While everything is put together in first-class manner, yet the price is such as to compare with all. Further information furnished by Scanlon & Co., Portland, Me.



A NEW ENGINE.

Big Machinery Contracts

The machinery trade generally will be interested in the following brief statement of contracts just placed by the Madison Car Co. for iron and wood-working tools and other supplies for the equipment of the mammoth shops in the town of Madison, lately established at the east end of the new Merchants' bridge. Parenthically, we may state that the plant in question will be the largest establishment for the manufacture of freight cars solely in the world. There will be three buildings, ranging from 650 to 935 feet each in length. The capacity will be 26 new cars a day and repairs for 100 cars besides.

Only the principal items in their contracts are given: Niles Tool Works, Hamilton, O, iron-working machinery to the amount of $39,000 or $40,000; Manning, Maxwell & Moore, New York, $3 000; A. B. Bowman, St. Louis, hammers, $3,000; A. T. Gerrans, St. Louis, eight bolt cutting machines of new design, $4,000; National Machinery Co, Tiffin, O., bolt pointers and nut tappers, $2,000; Blakeslee Manufacturing Co., Cleveland, upsetters, $7,500; L. M. Rumsey Manufacturing Co., St. Louis, Sturtevant blowers, drills and small lathes, $3,000.

Wood-working tools.—Berry & Orton Co., Philadelphia, heavier styles of timber dressing and special car machinery, $15,000; Greenlee Bros. & Co., Chicago, all the saws and all the hollow mortisers, $15,000; Hall & Brown Wood-working Machinery Co., St. Louis, planers and matchers, $3,000; J. A. Fay & Co., Cincinnati, duplex planer and gaining machinery, $3,000; A. Blackner, Minneapolis, Minn., buzz saw sharpeners.

Other items of equipment embraced the following: John O'Brien & Co., St. Louis, nine tubular boilers and 80-wheel annealing pits, $18,000; Ranken & Fritsch Foundry & Machine Co., St. Louis, one 400 and one 600 horse-power Corliss engine; Buffalo Scale Co, Buffalo, N. Y., two 50-ton 36-foot track scales; Detroit Foundry Equipment Co, Detroit, cupolas and foundry equipment.—[Age of Steel, St. Louis.

It is expected that the difficulties which have been encountered in the province of Huelva (Spain) owing to the open-air calcination of the ores will shortly be overcome. The Ministerial Council, recently, decided to definitely regulate this free calcination, which had become obnoxious, owing to the fumes given off, on the basis of an indemnity to be paid by the owners of he mines, and the amount of which is to be fixed on a future occasion.

A METALLURGICAL CALENDER.

Iron, tin, lead, copper and quicksilver were discovered in prehistoric times, and before the chronology of events was a necessity or a science. The rotation of discovery is interesting as illustrating the progress of man in metallurgy, and the remarkable coincidence of discovery with industrial development.

Antimony was discovered by Basilus Valentinus, 15th century.
Zinc, recognized by Basilus Valentinus, 15th century.
Zinc smelting, introduced about 1730.
Platinum, recognized by Ward about 1730.
Nickel, discovered by Cronstedt, 1774.
Manganese, discovered by Scheele, 1774.
Tellurim, discovered by V. Reichembach, 1782.
Tungsten, discovered by D'Elhujart, 1783.
Uranium, discovered by Klaproth, 1789.
Titanium, discovered by Klaproth, 1795.
Chromium, discovered by Vanquelin, 1789.
Cadmium, discovered by Stromeyer, 1818.
Aluminum, discovered by Wohler, 1828.
Magnesium, discovered by Bussy, 1829.
Vanadium, discovered by Sefstrom, 1830.
Thallium, discovered by Crookes, 1861.
Gallium, discovered by de Boisbandran, 1875.

In manufactured products and their introduction into the industrial programme of history:

Cast iron, introduced about 14th century.
Tin plate, invented about 16th century.
Crucible steel invented by Huntsman, 18th century.
Rolling mill, invented by Payne, 1728.
Coke introduced in iron making, by Darby, 1735.
Puddling forge, patented by Cort, 1784.
Pneumatic steel process, patented by Bessemer, 1856.
Siemen's steel process introduced, 1867.
Basic steel process, patented by Snelus, 1872.
Hot blast, patented by Neilson 1828.
Blister steel first made in America, 1830.
Iron first made with coke in America, 1835 (at Mary Ann Furnace, Pa).
Anthracite coal used in iron making by Geissenhainer, 1836.
Anthracite coal used in iron making by Crane, 1837.
Iron ship-building begun, 1839.

In the development of American metallurgy, the following calendar of dates is instructive and interesting:

Iron ore first discovered in North Carolina, 1585.
Iron first made in Virginia, 1608.
Lead first mined in United States, 1700.
Iron first made in Pennsylvania (Berks County), 1716.
Lead first mined in Missouri, 1720.
Principo Iron Works, Maryland, established 1721.
Durham Iron Works, Pennsylvania, established 1727.
Ringwood Iron Works, New Jersey, established 1740.
Oxford Iron Works, New Jersey, established 1742.
Cornwall Iron Works, Pennsylvania, established 1742.
Sterling Iron Works, New York, established 1751.
Franklin Iron Works, New Jersey, established 1770.
Catoctin Iron Works, Maryland, established 1774.
Iron first made in Alabama (Franklin County), 1818; abandoned in 1827.
Iron first made in Western Pennsylvania, 1790.
Iron first made in Pittsburgh, 1792.
Above enterprise abandoned, 1794.
Iron first made in Ohio (Mahoning County), 1804.
Iron first made in Lehigh Valley, 1805.
Connellsville coke industry started, 1841.
Alabama iron industry re-established (Calhoun County), 1843.
Iron ore discovered in Michigan, 1844.
Steam hammer invented by Nasmyth, 1842.
Copper mining began on Lake Superior, 1854.
Connal's stores started in Glasgow, 1845.
Iron first made with raw coal in America, 1845, at Clay Furnace, Pa.
First pig iron made in Pittsburgh since 1795, 1859.
Bessemer process introduced in America, 1864, at Wyandotte, Mich.
Calumet and Hecla mine opened, 1866.
Prohibitive copper tariff enacted, 1869.
Copper mining begun in Spain, about 1870.
Lead mining begun in Kansas, 1871.
Tin found in Dakota, 1882.

The expansion of metallurgical industries has been continuous this side of the Atlantic, till it has reached its present magnificent proportions that place it in the front rank of all metal-working nations.

THE NEW STYLE OF STEEL BUILDING.

The Columbia Iron & Steel Co., whose mill is at Uniontown and office in Pittsburgh, will furnish the steel for the Masonic Temple, of Chicago, the great building of which so much has been published. An idea of the magnitude of the contract can be gained when it is stated that it aggregates $300,000, and that the building will be 20 stories high—the highest in the world—and that a skeleton building will be constructed of steel, around which the masonry will be built. This skeleton is of interlaced steel shapes, so strongly arranged that it would stand alone and bear the weight of occupancy without the walls of stone. As the beginning of a new era in building in which our iron and steel workers are interested, we give the following brief description: The building will be 113 by 170 feet in dimensions, and will be built on a foundation of steel rails instead of stone. It will front on three sides alike, and the stories, instead of being called floors, will go under the name of streets, of which there will be 16 in the building. The steel work will weigh between 3,500 and 4 000 tons, and will be made ready here to put together without any alterations. Every piece will be exactly fitted, holes drilled, connections dovetailed and all calculations adjusted, so that the work of erecting the skeleton will progress with celerity and neatness. This part of the work will proceed independently of the masonry, and, as remarked hitherto, will be of such a character that the entire work of erecting the steel structure could be completed before the masons and bricklayers begin work. Still, this will probably not be done, the steel work being put in position only a few stories ahead of the masonry.

It is understood that the Columbia will begin work at once, as the contract calls for their work to be completed and under roof by September 1, and the extra buildings finished by May 1, 1892. There was sharp competition for the work by Pittsburgh and Chicago mills, and it is "a feather in the cap" of the Columbia that it "carried the day." This style of building will add materially to the demand for rolled steel, hence we are especially pleased to note every item of the kind.—[National Labor Tribune.

A Revolution in Iron Mining.

It is entirely safe to declare that a recent move on the part of the Hamilton Ore Co., of Iron Mountain, Mich., means a revolution in the working of the mines of the Lake Superior iron ranges, in so far as the economic utilization of the power employed is concerned. That company has contracted with Mr. F. W. Bosson, manager of the Northern Thomson-Houston agency, of this city, for an electrical pumping plant, the first application of electricity for power purposes in the mines of Lake Superior. The work of preparing the engine house for the plant has already commenced. The dynamo will be of 80 horse-power, and will be seven feet in height, the largest on the peninsula

The significant fact in connection with this change from steam and compressed air to electricity for transmission of power is that the Thomson-Houston Co. guarantees to show in results, on pumping water from the mine, 77 per cent. of the energy contained in the fuel used under the boilers. Considering the fact that the power is conveyed from the engine house to the bottom of the mine, a distance of 2,000 feet, this is wonderful showing in comparison with steam or compressed air, and it is claimed that it will result in a saving of almost two-thirds of the expense for fuel. The saving can be readily understood. The full efficiency of the steam is secured, as the boilers, engines and dynamos are side by side, while in the distance which the electricity is conveyed from the generating dynamo to reach the electric motors connected with the pump the loss is practically nothing, as any desired weight of copper can be put in. Where a circuit is short enough to permit the use of sufficient copper, without rendering the cost prohibitive, the loss in the transmission is infinitesimal. When an efficiency of 77 per cent., using fuel as the basis of computation, can be guaranteed, it is time for all mine owners in the Lake Superior fields to begin to study the subject of electrical transmission of the power employed to run their pumps, drills, and all the machinery used in underground workings.—[Marquette (Mich.) Mining Journal.

A Historic Furnace.

A press dispatch from Phœnixville, Penn., says:

A historic property known as the Warwick Farm, over near St. Peter's, Chester county, was sold recently. The old Warwick furnace, which is one of the chief attractions of the farm, is conceded to have been the first in the United States to make iron, and was put in blast about the year 1736. At this furnace were cast most of the cannon used in the Revolutionary war by the Continental army. Although it has not been in operation for some years, many of the buildings about the furnace are still standing and in a good state of preservation.

In the meadows, near by, many pieces of artillery lie buried, having been secreted in that way by the managers of the furnace, in order to prevent their falling into the hands of the British after the battle of Brandywine, in 1777. At that time, Gen. Washington retreated with his troops northward through Chester county, thus leaving this important iron furnace exposed to the mercy of the enemy. In 1876, several of these cannon were dug up and sent to Philadelphia as exhibits in the Centennial Exposition. Others have been sent to Paoli, Valley Forge and elsewhere as relics. The old bell cast at this furnace in 1777, and used in the belfry for many years, is now kept as a souvenir in Independence Hall, Philadelphia.

THE Bavarian Government has declined to grant a petition presented to it by the largest Bavarian iron works, the Max Works, in the Upper Palatinate, which prayed the government, in the name of the national industry, not to accept any tenders for rails except of Bavarian manufacture. So far from acceding to this request, the Munich authorities have ordered two-thirds of the rails they want from Prussia, one-third from English works.

INDUSTRIAL SUMMARY.

New Enterprises:—

G. B. Gray, of Oakland, Cal., will establish a nail factory at Seattle, Wash.

A hardware factory, to cost $26,700, is to be established at Middleville, Mich.

The Dayton Steel Chain Co., of Dayton, O., has been incorporated, with a capital stock of $15,000.

Paulus & Williamson Architectural Iron Co. has been incorporated at St. Louis; capital stock, $10,000.

The A. T. George Motor Co., of Kansas City, Mo., has been incorporated, to manufacture spring motors for street cars.

Pittsburgh (Pa.) capitalists are investigating with a view to establishing an iron foundry and novelty works in East Texas.

The Midland Foundry Co. has been incorporated, at Chicago, with a capital stock of $20,000, to do a general foundry and machine business.

The Brooks Axe & Edge Tool Works, at Brooksville, Vt., will probably be reopened in the Spring by a new company having a capital of $50,000.

St. Louis Steam Forge Co., of St. Louis, has been incorporated, with a capital stock of $10 000. The incorporators are G. C. McDonald, Charles McDonald and Eliza McDonald.

Ishpeming, Mich., has been selected as the site for a foundry to be erected by Carlos Sheldon and Seymour Holly, of Houghton. There will also be a machine shop for supplying mining machinery.

Henry Essex, W. H. Smith, E. M. Eaton and others have incorporated the Essex & Smith Manufacturing Co, to deal in and manufacture castings, implements and machinery, at Chattanooga, Tenn.

The Pittsburgh (Pa.) Portable Forge Co. has begun the erection of its new plant at Smallman. The company's specialties, besides portable forges, are steel barrows, railings, gratings, etc. The plant will be 52x79 feet.

Articles of incorporation have been filed by the Northwestern Engineering & Machinery Co., of St. Paul, Minn. The capital stock is $50,000, and the incorporators are Charles A. Daigh, W. G. Strickland and J. M. Badger.

The Chicago Steel & Specialty Co, of Chicago, has been incorporated, with a capital stock of $300,000, for the manufacture of steel and iron and their products. The incorporators are Harold Sturges, J. S. Ralston and Frank S. Betz.

A corporation, to be known as the Haywood Foundry Co., has been organized at Portland, Me. The company has a capital stock of $150,000; its officers are: President, Earl A. Thissel, of Florence, Mass.; Treasurer, H. Warner, of Florence, Mass.

The Gennett Air-brake Co. has been incorporated, with headquarters at Chicago, to manufacture air-brakes. The authorized capital stock is $800,000, and the incorporators are: David Wallach, Phillip Opper, Isaac Neuberger and Moses L. Rothchild.

A corporation, known as the Victor Electric Co., has been organized, with a capital stock of $100,000, Kittery, Me., for the purpose of manufacturing electrical apparatus. The officers are: President, F. H. Pray, of Boston, Mass.; Treasurer, John Hobbs, of Boston, Mass.

South Superior, Minn., has secured three new manufacturing plants. They are: Racine Malleable Iron Works, of Racine, Wis.; Pittston Stove Works, of Pittston, Pa., and the Elms Buggy & Carriage Works, of Jackson, Mich. The construction of buildings for these concerns will commence as soon as the weather is mild enough, in the Spring.

Announcement is made that a new company will operate the plant of the Center Iron Co., at Bellfonte, Pa., consisting of a blast furnace and muck mill. Robert, Abram S., George and Jacob B. Valentine, Daniel Rhodes, J. W. Gephart and John M. Dale have signed the certificate of incorporation and made application to the Governor for a charter. The new company will be named the Valentine Iron Co.

It is said that stockholders in the Pennsylvania Railroad Co. will build extensive car works at Milwaukee, Wis. A large tract of land has been secured and a company organized, with a capital stock of $800,000, of which between $500,000 and $600,000 has been subscribed. They will be the finest and most extensive car works in the country. Work will be commenced as soon as the weather will permit in the Spring.

The Lozier-Yost Seamless Steel Tube Co. has been incorporated, at Shelby, O., with a capital stock of $100,000. The company will manufacture cold-drawn, weldless steel tubes used in the manufacture of bicycles. This article is now produced in England only, and this factory will be the only one of its kind in America, as the company has secured the sole right of manufacture in this country. The plans and specifications of the buildings have been accepted and their erection will be pushed to a rapid completion. The following are the officers and directors: D. L. Cockley, Shelby, President; H. A. Lozier, Cleveland, Vice-President; B J Williams, Shelby, Secretary and Treasurer; J L. Yost. Toledo, General Manager. Directors: J L. Y. Toledo, H. A. Lozier and N. A. Gilbert, Cleveland; B. J. Williams, J. A. Seltzer and D. L Cockley, Shelby.

Additions, Enlargements, Removals, etc:—

The new building of the Muskegon (Mich.) Foundry & Machine Co. is nearing completion.

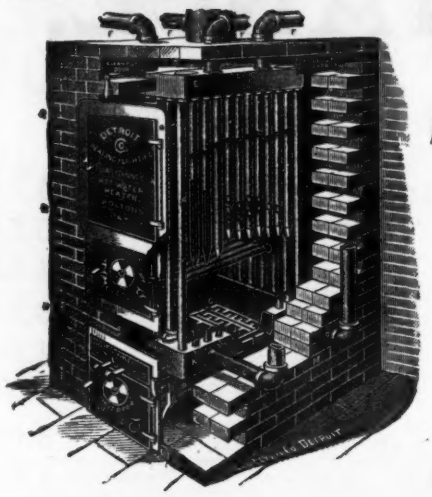
W. H. Phillips, of Taunton, Mass., will, it is stated, probably remove his foundry and machine shops to Middlesborough, Ky.

The iron foundry and machine shop of the American Bridge & Iron Co., at Roanoke, Va, recently damaged by fire, will be rebuilt.

Work on the new factory of the South Wareham (Mass.) Nail Works is being pushed rapidly forward. New machines are to be put in.

The Lackawanna and Scranton Steel & Iron Cos.', at Scranton, Pa., two of the largest plants of their kind in this section, consolidated their interests

BOLTON



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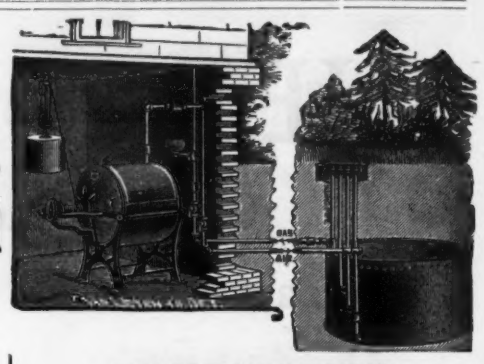

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January 13th, in order to be better able to compete with Western mills. The combined capital is $2,000,000 and 3,000 men are employed.

The Kingsley Foundry & Manufacturing Co., of Elyria, O., have secured a location in Hammond, Ind., and will erect on it a plant to cost $30,000.

It is stated that the Rogers-Spencer Co., of Springfield, O., are investigating Roanoke, Va., with a view of moving their plant to the latter place.

It is reported that Rockford, Ill., is figuring for the removal to that city of the Standard Foundry & Manufacturing Co., of Cleveland, which gives employment to 250 men, and daily melts 20,000 pounds of iron.

The Western Rolling Stock Co., of Chicago, has been incorporated with a capital stock of $100,000, by George E. Farley, Grant S. Wheeler and William E. W. Johnson. It will manufacture cars, engines and other rolling stock.

The Canonsburg Iron & Steel Co., of Canonsburg, Pa., has decided to greatly enlarge its capacity. The firm manufactures sheet iron and steel for stamping purposes and galvanizing. The present capacity is about 4,000 tons per year.

A large tire mill is being constructed at Youngstown, O., for the Latrobe Steel Works, which will roll a tire from the size of the largest locomotive to that of a small car wheel. The mill weighs 100 tons, contains seven hydraulic cylinders, and will be driven by a pair of 1,400 horse-power engines.

General Industrial Notes:—

The Jeffrey Manufacturing Co., of Columbus, O., manufacturers of chain belting, elevating and conveying machinery, are still enjoying a good trade, and are busy in all of their different departments.

The steel plant of the Benwood Iron Works, at Benwood, W. Va., has closed down for two or three weeks. The soaking pits and producers, some of which have not undergone repairs for several years, need repairing.

Messrs, Hussey, Binn & Co., Limited, of Pittsburgh, on the 12th melted the first crucible steel ever produced in Washington county, at their new works in Charleroi. The melting furnaces are in operation, and the machinery is being moved to the new plant.—[American Manufacturer.

It is the intention of the owners of Peekskill Furnace, at Peekskill, Westchester county, N. Y., to put the furnace in blast next Spring or Summer. It has been idle for several years, but it is fully repaired and ready for work. It is owned by Senator John P. Jones, of Nevada, and others.

James Hooven, owner of the Norristown Iron Works, comprising a rolling mill, pipe mill and blast furnace, has just transferred the management of the two mills to his son, having decided to withdraw from active business pursuits. The furnace is now leased by Isaac McHose & Sons. Mr. Hooven will be 83 years old in March. He has been actively engaged in business in Norristown since 1830.—[Bulletin.

The Laidlaw & Dunn Co., Cincinnati, O., announce that they have bought the entire plant of the Eclipse Manufacturing Co., of Cincinnati, O., consisting of all their patents, patterns, drawings, tools and machinery, and stock of all kinds. They will be pleased to see the customers of the late Eclipse Pump Manufacturing Co., and are prepared to fill orders for pumps, and repairs from patterns formerly owned by them.

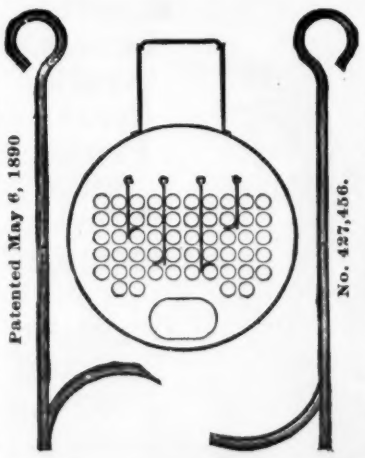
The coal mine supply department of the Oliver Iron & Steel Co., Pittsburgh, Pa., has been sold to the Phillips Mine Supply Co., with John M. Phillips as Secretary and Manager. The new company are adding new machinery, and putting themselves in shape for handling the large increased business that they are assured of. They are very busy now putting in the mining machinery into the new Helvetia mines, at Punxsutauney, Pa.

The New York Central Iron Works Co. is the only one of the large iron-handling concerns here that does not shut down during "the dull season" This simple fact speak volumes for the enterprise, push and business success of this long established concern. Merit is sure to bring its own reward, and the success which enables this company to know no dull season, is owing to the merit attached to its main products, Dunning's unrivaled steam-heating and hot-water boilers.—[Geneva (N. Y.) Gazette.

The Illinois Steel Co.'s works, at Milwaukee, Wis., it is said, did a business during 1890 aggregating $5,500,000. A nine-inch train was added to the plant. It has a monthly capacity of 1,000 tons of finished product. The only department not in operation during the past year was the nail factory. The nail plate train has been converted into a splice bar mill, which makes two mills of this character at the plant, giving them the largest capacity in the United States. Over 75,000 tons of iron ore and coal were received at the company's dock. The total finished product will foot up to nearly 100,000 tons, which is shipped to all parts of the country.

The public announcement is made of the withdrawal of Mr. J. W. Britton from the Britton Iron & Steel Co., and of the formation of a new company under the name of the Britton Rolling Mill Co., of Cleveland. These works are situated at Hoyt avenue and L. S. & M. S. Ry., and are entirely new and equipped with the latest and best machinery, and are excellently situated for rolling mill purposes. It is the intention of this company to make the finest quality of steel for the purpose for which it is to be used; special attention being given to soft steel sheets, with fine finish, rolled extra wide and long, and great care taken as to exact gauges. Among the articles they will manufacture may be mentioned sheets for blanking and deep stamping, steel and iron tank plate, firebed, gasometer, stove and range top, and tack plate. Absolutely level sheets of all kinds will be made a specialty.

THE Standard Oil Co. have now control, it is reported, of nearly every tank steamer carrying petroleum from the United States to Europe. With their recent purchases the company's fleet now includes 21 steamers of this class, having a total capacity of 24,435,000 gallons, or enough, it is claimed, to carry in 20 trips the entire year's exports.



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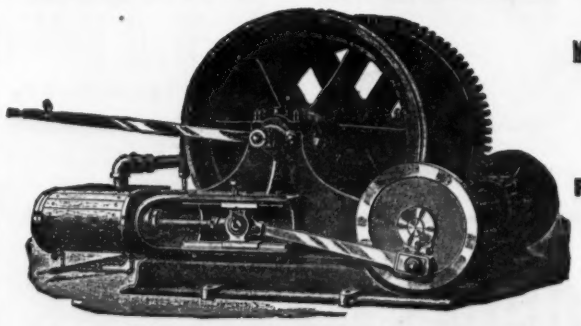

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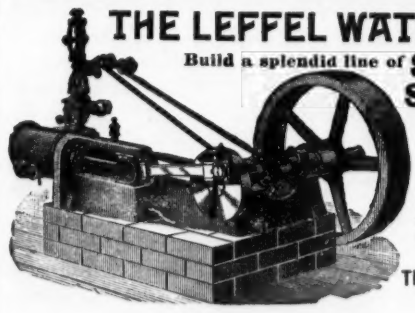

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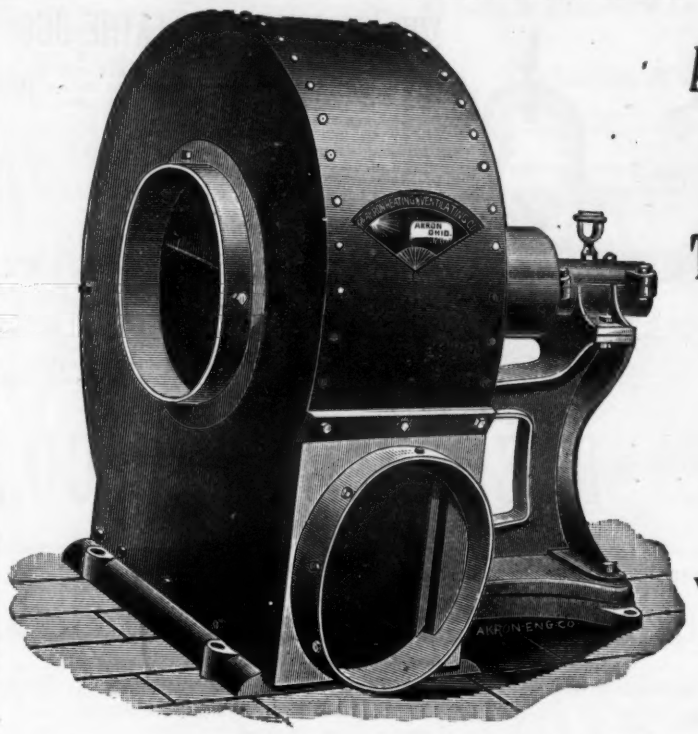

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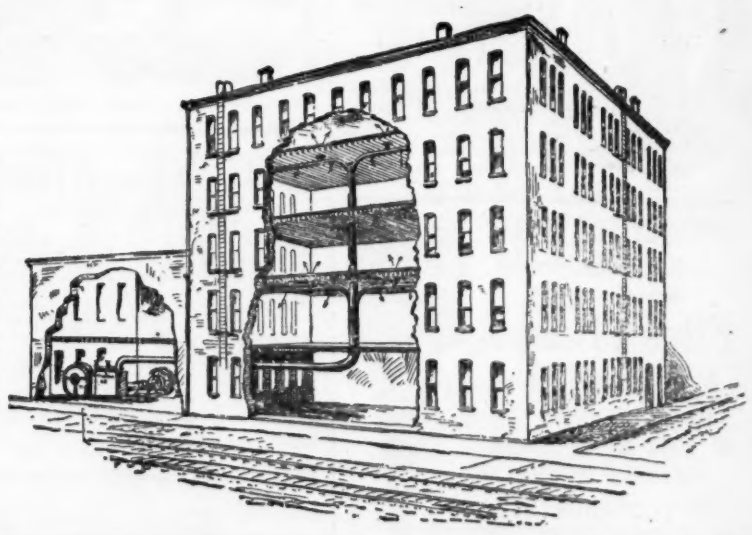

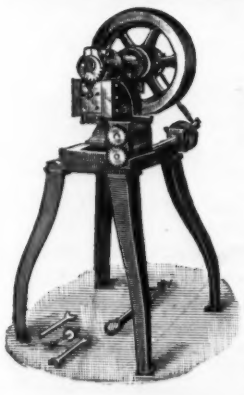

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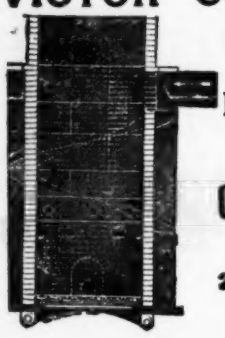

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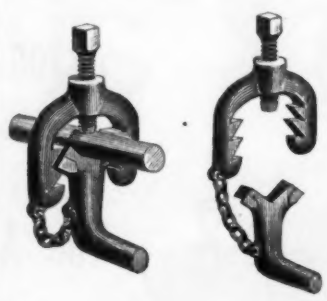

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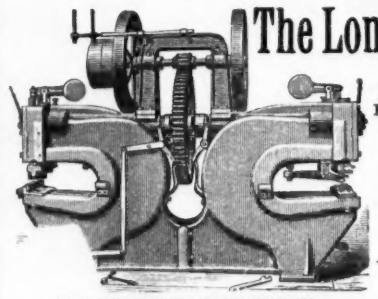

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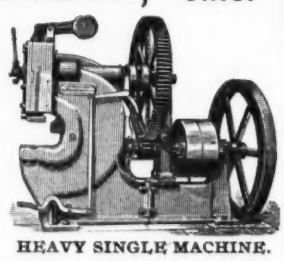

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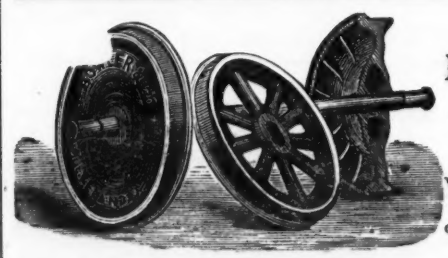

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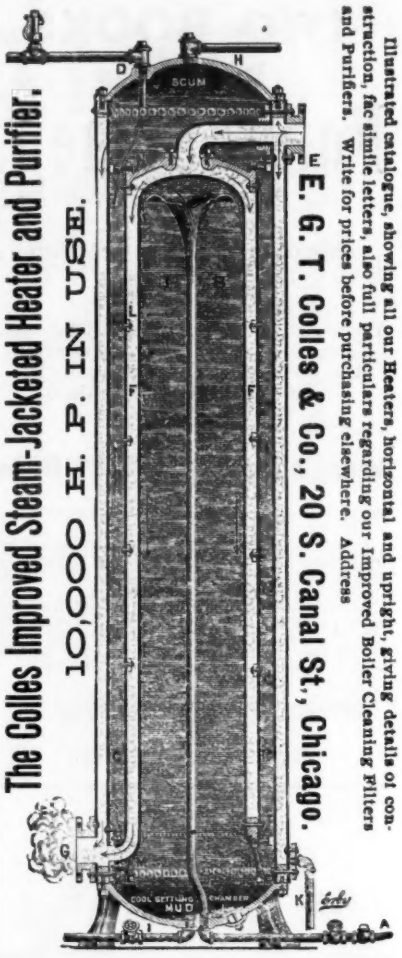

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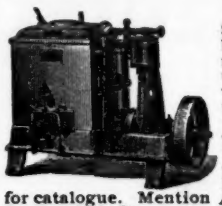

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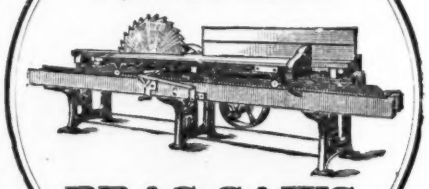

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1 to 1⅞ inch	1 80
2 to 2¾ inch	2 00
2⅞ to 3¼ inch	2 10
3⅜ to 4 inch	2 80
4⅛ to 4½ inch	3 10
4⅝ to 5 inch	3 50

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⅜ to 1¼ inch	2 20
½ to ¾ inch	2 40
⅞	2 60
1	3 00

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1¼ to 3 inch	2 90
⅜ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅞	3 50
1	4 80

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¼ to 6 by ¼ and 5-16 inch	2 00
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1¼ to 1½ by ¼ and 5-16 inch	2 30
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1¼ to 4, Nos. 13 to 15	2 60
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1¼ to 2, No. 21	3 00
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1 to 1¾ by Nos. 11 and 12	2 50
⅞ and 13-16 by ⅛ to 3-16 in	2 70
⅞ and 13-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ⅛ to 3-16 in.	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ¾ to 3-16 in	3 60
½ by Nos. 11 and 13	3 70

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Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

H. E. COLLINS & CO., Agents Magnetic Separator Co.,

BANK OF COMMERCE BUILDING, PITTSBURGH, PA. ALDRICH COURT, 45 BROADWAY, NEW YORK

Cleveland Iron Mining Co.,

Mercantile Bank Building,

CLEVELAND, O.

Organized 1850.

Total Production to Date, 4,200,000 Gross Tons.

Dealers in Lake Superior iron ore from their own mines at Ishpeming, Mich.

Specially adapted for making strong, tough iron, and for carrying large proportions of mill cinder and cold short ores.

DALLIBA, CORRIGAN & CO.,

DEALERS IN

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Rooms 716, 717, 718, 719 Perry-Payne Bld'g,

CLEVELAND, O.

OGLEBAY, NORTON & CO.,

Successors to Tuttle, Oglebay & Co.,

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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

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J. H. OUTHWAITE & CO.,

Exclusive attention given to

LAKE SUPERIOR AND MENOMINEE RANGE

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THE CONDIT-FULLER CO.,

Pig and Bar Iron,

CLEVELAND, OHIO.

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MINERS AND SHIPPERS OF

Ohio Steam Coal and Coke.

Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.

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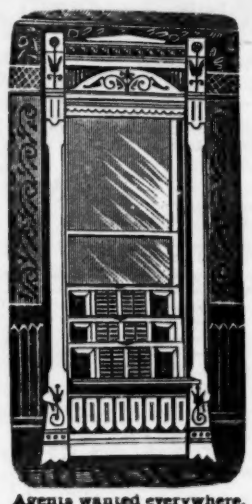
Lake Shipping Point, Lorain O

JAS. PATTERSON, Sales Agent.

Hartman's Patent Inside Sliding Window Blind



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Not Complicated. The Only Blind that is furnish'd with an automatic Burglar-Proof Lock, free of charge. This is an item of immense magnitude, and may save you many times the cost of blinds & perhaps life also, and the only blind that gives entire satisfaction.

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Harlow Lubricator.

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Care Iron Trad Rev ew.

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COWLES

Pure Aluminum

$1.25 PER POUND.

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The Cowles Electric Smelting & Aluminum Co.,

LOCKPORT, N. Y.

Also manufacturers of

Cowles Aluminum Bronze,
Cowles Aluminum Brass,
Cowles Silver Bronze,
Cowles Silicon Bronze,
Cowles Aluminum Iron

INGOTS AND CASTINGS.

Correspondence solicited.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¾@10¾

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill .....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills .....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
¼ kegs ₩ lb	4½c	5½c		2¾c
½ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11¾	8⅛	6	5⅜	5¼	5
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ¼c., lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 13¾
Sisal, ½ inch and over .....₩ lb 11¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@ 5
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls		21c@29c
No. 18 " " ¼ and ⅛ "		18c@28c
No. 36 " " ¼ and ⅛ "		16c@27c
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine)	11¼c	
3-Ply " 1 lb Balls	12@12¼c	
3-Ply " 1½ lb Balls	11@11¼c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

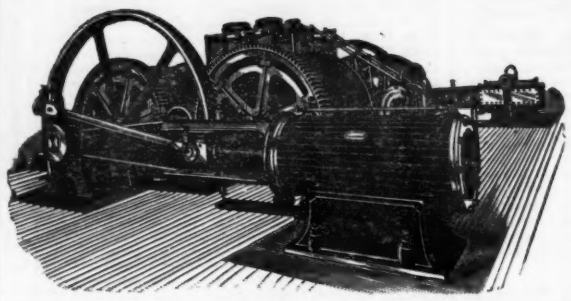
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00 lb dis 5

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Webster, Camp & Lane Machine Co.



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Mining Machinery,

Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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CLEVELAND. O.

LIGHT AND HEAVY

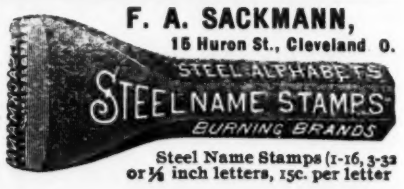
IRON CASTINGS.

DAILY MELTING CAPACITY 75 TONS-SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.

DUPLICATE WORK A SPECIALTY

F. A. SACKMANN,

15 Huron St., Cleveland O.



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FROM 1-4 TO 15,000 LBS. WEIGHT.

True to pattern, sound, solid, free from blow-holes and of unequaled strength.

Stronger and more durable than iron forgings in any position, or for any service whatever.

60,000 CRANK SHAFTS and 50,000 GEAR WHEELS of this steel now running prove this.

Crossheads, Rockers, Piston-Heads, etc., for Locomotives. STEEL CASTINGS of every description.

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CHAIN BELTING,

MADE IN ALL SIZES OF

Malleable Iron and Steel,

DESIGNED FOR

Elevators, Conveyors, Drive Belts, etc.

For handling materials of all kinds.

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COLUMBUS, O.

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"Treated" COTTON, Rubber Lined

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Fabric Fire Hose Co.,

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OIL ALWAYS BELOW BURNERS---BY USING OUR SYSTEM.
OUR SYSTEM IS INSURABLE IN ALL INSURANCE COMPANIES.
WE GUARANTEE INSURANCE WHEN PLANT IS INSTALLED ACCORDING TO OUR SPECIFICATIONS.

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425 MAIN STREET, SPRINGFIELD, MASS.
FORGING, WELDING, BRAZING, MELTING, ANNEALING, HARDENING, TEMPERING.
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SEND FOR CATALOGUES.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&5
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

Eberts Bros., Detroit.	Per roll of 500 sq. feet.
No. 1—Slaters'.....$1.25	
"A," Stringed Roofing, Light.	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ℔ ton.....$30.00
Asphaltum, Fine Grade, ℔ lb.....08
Coal Tar Felt, 1 Ply, ℔ lb.....02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft.....1.85
Roofing Pitch, ℔ gal.....09

Chains.

Revised List.

Trace, 6¾-10-2.....℔ pair 1.03
Trace, 6¾-10-3.....℔ pair .92 .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ lb 5¾@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Pans, slop, 5 and 5X 14 qt	8 00	9 00	10 00

Basins, wash—

	Nos. 1	5.	5X.
10⅝ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13⅜ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11⅝ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ℔ lb.	23	24	25	26	28	dis 40
Putnam, ℔ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@[illegible]...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 35&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds.....dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds.....dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 4 &10
Copper finishing and trunk nails.....dis 50&10
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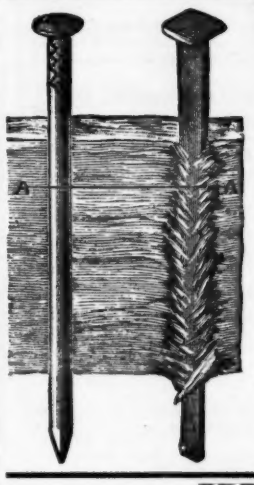

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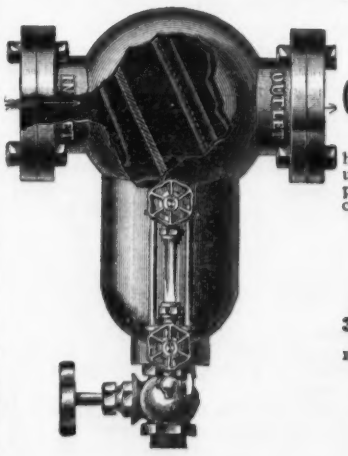

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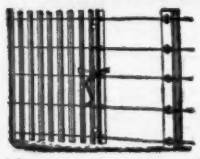

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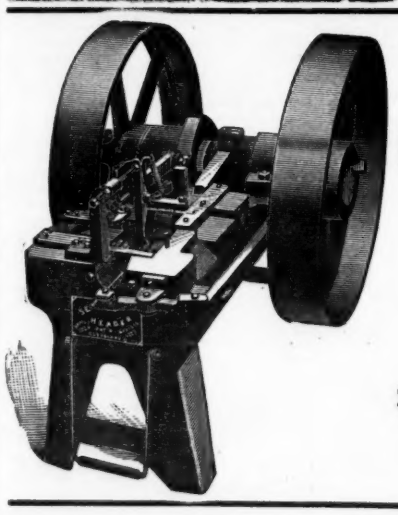

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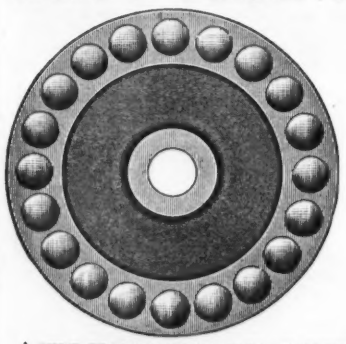

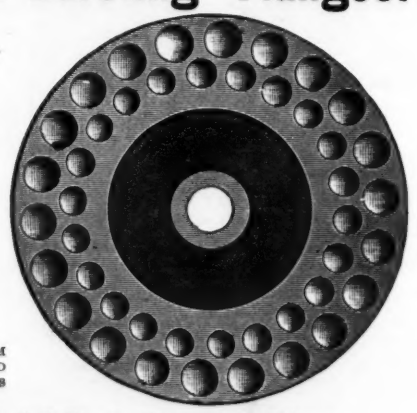

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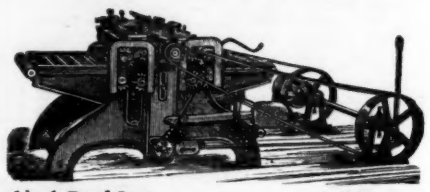

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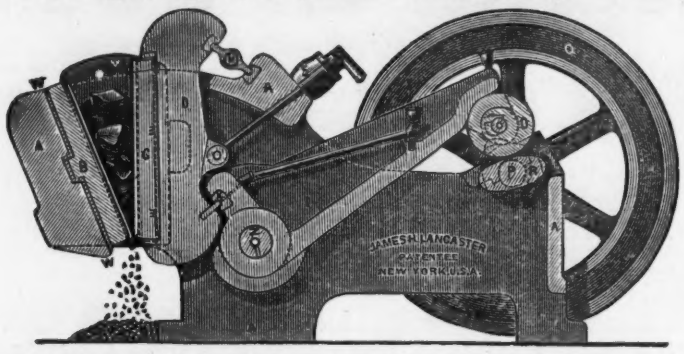

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Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
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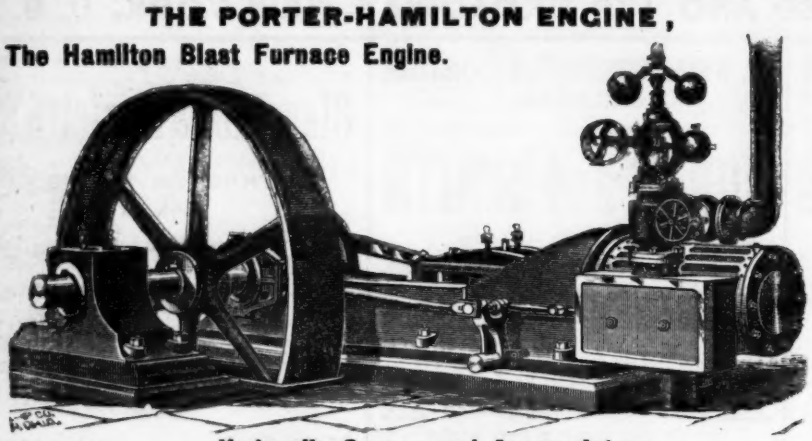

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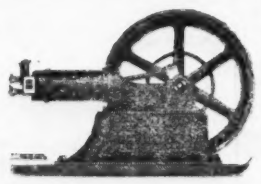

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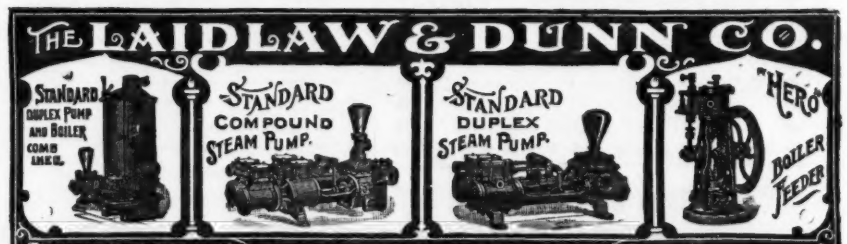

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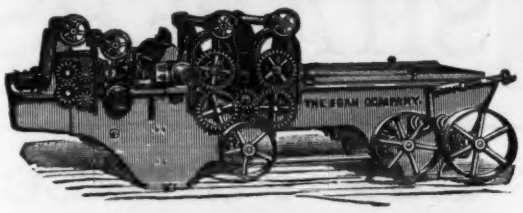

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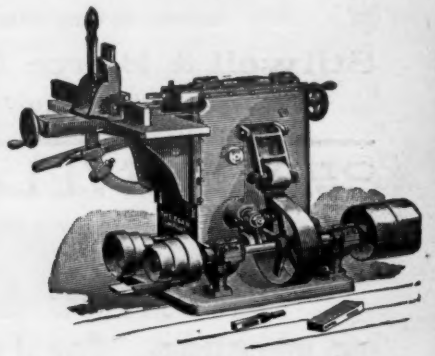

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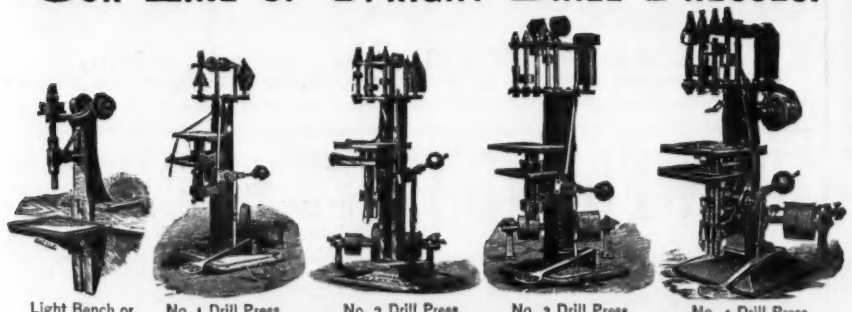

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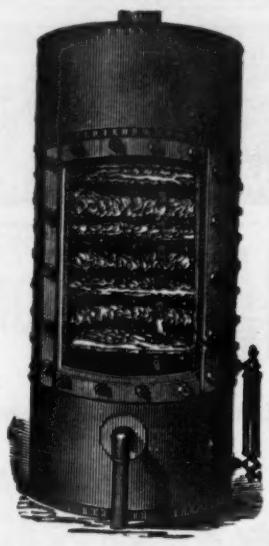

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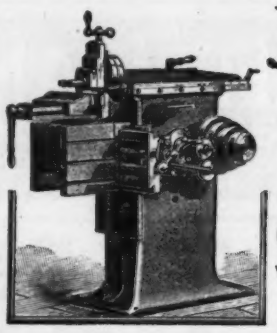

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